AMENDMENTS TO THE CLAIMS

In the Claims:

This listing of claims replaces all prior versions, and listings, of claims in the application:

1. (currently amended) An optical system, comprising:

an optical sensor having an array of light receptors having a pixel pitch; and

a lens optically associated with the optical sensor along an optical path, the lens having a diffraction limited spot size and configured with optical parameters functionally related to the pixel pitch and a desired resolution of the optical system, such that the lens is operative to substantially map a portion of the diffraction limited spot size ~~an object having the desired resolution along the optical path~~ to an associated one of the light receptors ~~, the lens comprising a numerical aperture to be functionally related to a ratio of a wavelength of light employed to illuminate an object and the desired resolution, the numerical aperture (NA) being computed according to the expression: NA = (0.5 x λ)/y, where λ is the wavelength of light and y is the pixel pitch~~.

2. (original) The system of claim 1, the optical parameters including a magnification functionally related to a ratio of the desired resolution and the pixel pitch.

3. (previously presented) The system of claim 1, the sensor further comprising at least one of a CMOS sensor and a Charge Injection Device (CID) sensor.

4. (original) The system of claim 1, the desired resolution being at least equal to a diffraction limited spot size.

5. (previously presented) The system of claim 1, the optical parameters including a magnification of the lens.

6. (previously presented) The system of claim 5, the magnification being functionally related to a ratio of the desired resolution and the pixel pitch.

7. (original) The system of claim 1, the lens further comprising at least one of an aspherical lens, a multiple lens configuration, a fiber optic taper, an image conduit, and a holographic optic element.

8. (original) The system of claim 7, the lens further comprising a plurality of lenses comprising a first lens positioned toward the object field of view and a second lens positioned toward the sensor, the first lens having a focal length that is smaller than the second lens.

9. (original) The system of claim 1, the sensor further comprising at least one of a digital sensor, an analog sensor, a Charge Coupled Device (CCD) sensor, a CMOS sensor, a Charge Injection Device (CID) sensor, an array sensor, and a linear scan sensor.

10. (original) The system of claim 1, further comprising an illumination source to illuminate the object.

11. (original) The system of claim 10, the illumination source further comprises a Light Emitting Diode.

12. (previously presented) The system of claim 10, the illumination source further providing at least one of coherent light, non-coherent light, visible light and non-visible light, the sensor being configured to sense the light from the illumination source.

13. (currently amended) A method of designing an optical system, comprising:

selecting a sensor with a plurality of light receptors having a pixel pitch;

selecting a desired minimum spot size resolution for the system; and

providing a lens configured with optical parameters based on the pixel pitch and the desired minimum spot size ~~;~~

~~computing a magnification for the lens to be functionally related to a ratio of the desired resolution and the pixel pitch; and~~

~~computing a numerical aperture to be functionally related to a ratio of a wavelength of light employed to illuminate an object and the desired resolution;~~

~~the numerical aperture (NA) being computed according to the expression: NA = (0.5 x λ)/y, where λ is the wavelength of light and y is the pixel pitch~~.

14. (currently amended) The method of claim 13, further comprising selecting the lens to have a magnification functionally related to a ratio of the desired resolution and the pixel pitch and selecting a sensor from the group consisting of a digital sensor, an analog sensor, a Charge Coupled Device (CCD) sensor, a CMOS sensor, a Charge Injection Device (CID) sensor, an array sensor, and a linear scan sensor.

15. (currently amended) The method of claim 14, the optical parameter comprising a numerical aperture of the lens, the numerical aperture being functionally related to a ratio of a wavelength of light employed to illuminate an object and the desired resolution ~~further comprising manufacturing an optical system according to the method of claim 14~~.

16. (currently amended) The method of claim 13, further comprising computing a magnification for the lens to be functionally related to a ratio of the desired resolution and the pixel pitch, and computing a numerical aperture to be functionally related to a ratio of a wavelength of light employed to illuminate an object and the desired resolution ~~further comprising manufacturing an optical system according to the method of claim 13~~.

17. (cancelled)

18. (original) The method of claim 13, the desired resolution being greater than or equal to a diffraction limited size functionally related to a wavelength of light that illuminates the object and which the sensor is operative to sense.

19. (previously presented) A method of designing an optical system, comprising:

providing a sensor array operative to sense light and provide a sensor signal having an electrical characteristic indicative thereof, the sensor array comprising a plurality of light receptors arranged along a surface thereof according to pixel pitch, the sensor comprising at least one of a CMOS sensor and a Charge Injection Device (CID) sensor;

selecting a desired resolution for the optical system that is greater than or equal to a diffraction limited spot size;

computing a magnification for at least one lens as a function of the desired resolution and the pixel pitch; and

computing a numerical aperture for the at least one lens as a function of at least one wavelength of light for use in illuminating an object and the desired resolution,

the numerical aperture (NA) being computed according to the expression: $NA = (0.5 \times \lambda)/y$, where λ is the wavelength of light and y is the pixel pitch.

20. (original) The method of claim 19, further comprising manufacturing an optical system according to the method of claim 19.

21. (new) The system of claim 1, the lens comprising a numerical aperture to be functionally related to a ratio of a wavelength of light employed to illuminate an object and the desired resolution, the numerical aperture (NA) being computed according to the expression: NA = (0.5 x λ)/y, where λ is the wavelength of light and y is the pixel pitch.

22. (new) The system of claim 1, the optical parameter comprising a numerical aperture of the lens, the numerical aperture being functionally related to a ratio of a wavelength of light employed to illuminate an object and the desired image resolution.

23. (new) An optical system, comprising:

an optical sensor having an array of receptors, the receptors having a pixel pitch; and

a lens optically associated with the optical sensor along an optical path, the lens having a diffraction limited spot size functionally related to the pixel pitch and a desired image resolution of the optical system, such that the lens is configured to scale the pixel pitch of the receptors within 20% of a diffraction limited spot size of the lens.

24. (new) The system of claim 23, the optical parameter comprising a numerical aperture of the lens, the numerical aperture being functionally related to a ratio of a wavelength of light employed to illuminate an object and the desired image resolution.

25. (new) The system of claim 23, the lens comprising a numerical aperture to be functionally related to a ratio of a wavelength of light employed to illuminate an object

and the desired image resolution, the numerical aperture (NA) being computed according to the expression: NA = (0.5 x λ)/y, where λ is the wavelength of light and y is the pixel pitch.

26. (new) An optical system, comprising:

an optical sensor having an array of receptors, the receptors having a pixel pitch; and

a lens optically associated with the optical sensor along an optical path, the lens having a diffraction limited spot size functionally related to a projected pixel pitch size and a desired image resolution of the optical system, such that the lens is configured to match the projected pixel pitch size to within 5% of a diffraction limited spot size of the lens.

27. (new) The method of claim 13, further comprising

computing a magnification for the lens to be functionally related to a ratio of the desired resolution and the pixel pitch; and

computing a numerical aperture to be functionally related to a ratio of a wavelength of light employed to illuminate an object and the desired resolution;

the numerical aperture (NA) being computed according to the expression: NA = (0.5 x λ)/y, where λ is the wavelength of light and y is the pixel pitch.

28. (new) An optical system, comprising:

a CMOS sensor having an array of receptors, the receptors having a pixel pitch; and

a lens optically associated with the CMOS sensor along an optical path, the lens having a diffraction limited spot size functionally related to the pixel pitch and a desired image resolution of the optical system, such that the lens is configured to scale the pixel pitch of the receptors within 20% of a diffraction limited spot size of the lens.